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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : F24C 3/00, 7/00

A1

(11) International Publication Number: **WO 99/45326**

(43) International Publication Date: 10 September 1999 (10.09.99)

(21) International Application Number: PCT/CA99/00190

(22) International Filing Date: 4 March 1999 (04.03.99)

(30) Priority Data:

09/036,003	4 March 1998 (04.03.98)	US
9812084.3	5 June 1998 (05.06.98)	GB
9822247.4	13 October 1998 (13.10.98)	GB

(63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application
US 09/036,003 (CIP)
Filed on 4 March 1998 (04.03.98)

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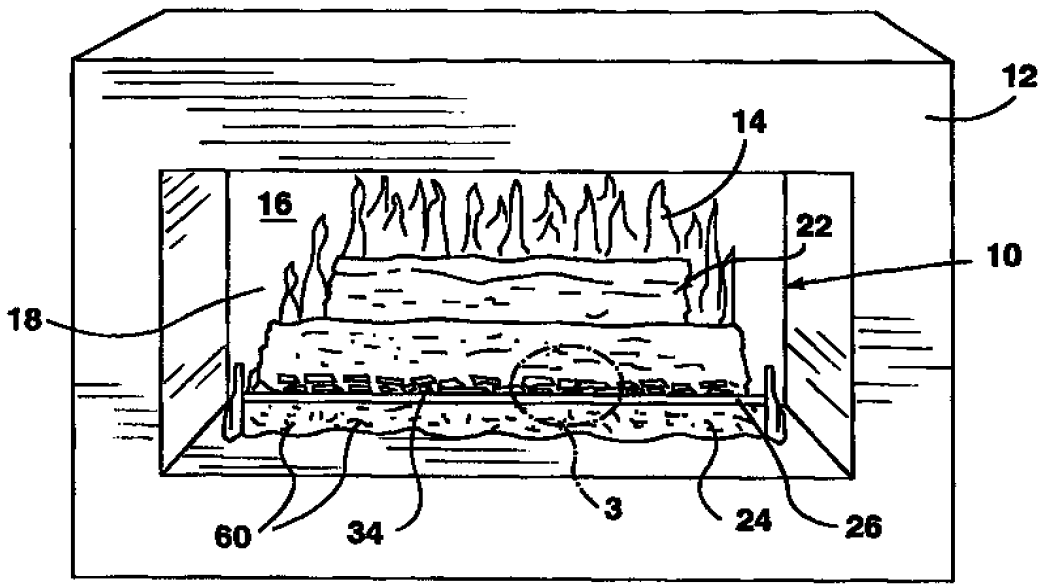
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: SIMULATED FUEL BED FOR FIREPLACE



(57) Abstract

A simulated fuel bed (10) for an electric or gas fireplace including an ember bed (24) and a combustible fuel (22). At least one reflector (34) is mounted to at least one of the ember bed (24) and the combustible fuel (22) in a position to simulate a hot ember by reflecting light transmitted from a light source (30).

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Title: SIMULATED FUEL BED FOR FIREPLACE

FIELD OF THE INVENTION

The present invention relates to components for electric or gas fireplaces and in particular to a simulated fuel bed.

BACKGROUND OF THE INVENTION

Simulated fuel beds are well known for use with electric or gas fireplaces. The fuel beds typically simulate combustible fuel, such as wood logs or lumps of coal, positioned upon an ember bed.

For electric fireplaces, simulated fuel beds are typically molded from plastic, fibreglass and/or ceramic materials that are colored or painted to resemble a combustible fuel arranged on a bed of embers. The appearance of glowing embers is provided by transmitting light from beneath the simulated fuel bed through colored translucent panels on the body of the simulated fuel bed.

For gas fireplaces, the simulated fuel beds are typically formed from cast concrete, ceramics or other suitable flame retardant materials that are painted to resemble a combustible fuel arranged on an ember bed. Rock wool is disposed on parts of the combustible fuel and the ember bed. The wool is heated to incandescence by the gas flames in order to simulate burning embers on the ember bed and on the combustible fuel.

While the use of translucent panels or rock wool provides a reasonably realistic simulated effect of glowing embers, there is a continuing need to improve the effect.

SUMMARY OF THE INVENTION

In one aspect, the invention provides a simulated fuel bed for a fireplace comprising:

an ember bed;

a combustible fuel; and

at least one reflector mounted to at least one of said ember bed and said combustible fuel in a position to simulate a hot ember by reflecting light transmitted from a light source.

Advantageously, the reflector allows for embers to be simulated, in a cost-effective manner, on portions of the fuel bed that are not translucent (for instance, on solid ceramic logs).

DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front perspective view of an electric fireplace incorporating a simulated fuel bed in accordance with the present invention;

Fig. 2 is a partial side view of the fireplace of Fig. 1;

Fig. 3 is an enlarged view of the portion of the fireplace indicated by arrow 3 in Fig. 1 showing a first embodiment of reflector arrangement;

Fig. 4 is an enlarged view of the portion of the fireplace indicated by arrow 3 in Fig. 1 showing a second embodiment of reflector arrangement;

Fig. 5 is a partial side view of a second embodiment of the fireplace of Fig. 1; and

Fig. 6 is a partial side view of a third embodiment of the fireplace of Fig. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A simulated fuel bed in accordance with the present invention is shown generally at 10 in Figs. 1-6. The fuel bed 10 is shown incorporated within an electric fireplace 12.

The preferred electric fireplace 12 produces a simulated image 14 of flames between the fuel bed 10 and a reflected image 10' of the fuel bed 10. The electric fireplace 12 includes a translucent screen 16 having a partially reflecting surface 18 located immediately behind the fuel bed 10 for producing the reflected image 10' of the fuel bed 10. The simulated image 14 of flames is created by reflecting light from a flicker element 20 located behind the screen 16 and transmitting the reflected light through a diffusing region 21 on the screen 16. More detail concerning the structure of the preferred embodiment of electric fireplace 12 is provided in U.S. Patents 4,965,707 and 5,642,580 which are incorporated herein by reference. It should be understood however that the invention is intended to be used, with necessary modifications, with other types of electric fireplaces as well as with gas fireplaces.

Referring to Figs. 1 and 2, it may be seen that the fuel bed 10 has a simulated combustible fuel 22, a simulated ember bed 24 and a real or simulated grate 26. The combustible fuel 22 is preferably formed from an expanded polystyrene material and colored to resemble wood logs. The ember bed 24 is preferably formed from a plastic material having red, orange or yellow colored translucent portions 28 to resemble an ember bed for the logs. The grate 26 is preferably formed from a metal or ceramic material and colored if necessary to resemble the metallic material of a real fireplace grate. The grate 26 is optional and the fuel bed 10 may be only made up of the combustible fuel 22 and ember bed 24. It will be understood that the elements 22, 24 and 26 of the fuel bed 10 may be constructed from any materials that accurately simulate the element in a cost effective and

functionally practical manner.

As shown in Fig. 2, a light source 30 such as one or more light bulbs is positioned underneath the simulated fuel bed 10. Light from the light source 30 is transmitted through the colored translucent portions 28 of the ember bed to give the illusion of burning embers. Light from the light source is also transmitted toward the flicker element 20 where it is reflected toward the rear of the screen 16 to produce the simulated image 14 of flames. The flicker element 20 is preferably rotatable about its center axis 31 so that the simulated flames 14 appear to flicker (as described in more detail in U.S. Patent 5,642,580). In the case where the fuel bed 10 is incorporated within a gas fireplace, the light source 30 could simply comprise the gas flames produced by the fireplace.

A plurality of reflectors 34 are disposed in an ember pattern 33 on parts of the combustible fuel 22 of the fuel bed 10 to reflect light that is transmitted from the light source 30. The reflection of light from the reflectors 34 gives the illusion of burning embers on the combustible fuel. The reflectors 34 may also be disposed on parts of the ember bed 24 where it is otherwise difficult to give the illusion of hot embers by transmitted light through colored translucent portions 28. For instance, red colored reflectors 34 may be mounted to an upwardly facing surface of the ember bed 24 to reflect light from a light source located at the top of the fireplace (not shown).

The reflectors 34 are mounted to the fuel bed 10 using a pressure sensitive glue (such as double-sided tape), a hot melt glue or any other suitable fastener that withstands the temperature associated with the electric or gas fireplaces. It has been found that double-sided tape allows a plurality of reflectors 34 to be applied at one time to a desired portion of the fuel bed 10. A transfer decal (not shown) is formed with the reflectors arranged in an ember pattern 33 as described further below. The sticky side

of the decal is then peeled off so the decal can be mounted to the fuel bed 10. The remaining portion of the decal that does not form the reflectors 34 is then peeled away so that all that remains is the reflectors 34 arranged in the ember pattern 33. This allows the reflectors to be mounted to the fuel bed 10 in a cost effective manner with a precise arrangement of reflectors 34 in the ember pattern.

Referring to a first embodiment depicted in Fig. 3, it can be seen that a plurality of reflectors 34, each polygonal in shape, are arranged in the ember pattern 33 with two opposing sides 36 of each reflector 34 extending generally parallel to the simulated grain 38 for the simulated combustible fuel 22. The reflectors 34 are arranged relative to each other such that they follow the grain 38. Wood logs for instance have a grain that extends longitudinally along the log. Lumps of coal also include a grain, although its direction is not apparent from the shape of the lump of coal. The ember pattern 33 of reflectors 34 includes non-reflecting spaces 40 between reflectors 34 to simulate cracks that would be found between embers on a burning fuel. The spaces 40 are generally uniform in width. The size and shape of the reflectors 34 varies however although most of the reflectors 34 will be generally trapezoidal in shape.

Referring to a second embodiment of reflector 34' depicted in Fig. 4, it can be seen that a single reflector 34' is provided which includes a plurality of reflective regions 41 and non-reflective regions 43. The shape and size of the respective regions 41 and 42 corresponds to the shape and size of the individual reflectors 34 and spaces 40 described for Fig. 3 above. The non-reflective regions 43 of the reflector 34' are formed by etching or by applying a paint, ink or other suitable non-reflective materials to the surface of a reflector 34.

It will be noted in Fig. 2 that the reflectors 34 are positioned in a number of distinct locations on the combustible fuel 22. Reflectors 34a

are positioned along a downwardly facing front surface 36 of a foreground log 39. Reflectors 34b are positioned along a downwardly facing rear surface 40 of the foreground log 39. Reflectors 34c are positioned along an upwardly facing rear surface 42 of a background log 44. The background log 44 is split such that it will appear as an entire log when combined with its reflected image 44' observed in the reflective surface 18 of screen 16. The foreground log 39 similarly has a reflected image 39'.

As shown in Fig. 2, depending upon their location, reflectors 34a, 34b and 34c each function differently in reflecting light from light source 30 to produce an illusion of embers. Reflectors 34a and 34b reflect light 46 that has been colored by passing through the translucent portions 28 of the ember bed 24. Light from reflectors 34a is directly observable by a viewer 48 located in front of the fireplace. Light from reflectors 34b is indirectly observable since the light must first be reflected again on the reflecting surface 18 of screen 16 before reaching the eye of the viewer. Reflectors 34c reflect light 50 that is transmitted through the diffusing region 21 of the screen 16. Light from reflectors 34c is indirectly observable by the viewer 48 since the light must first be reflected by the reflecting surface 18 of screen 16 before reaching the eye of the viewer. Any flickering of the simulated flame 14 that is reflected by the reflector 34c gives the enhanced illusion of corresponding changes of heat intensity for the simulated ember.

The reflectors 34 are each formed from a suitable reflective material such as a highly reflective metallic foil. A thin foil of chromed MYLAR™ or metallized polyester has been found to be a suitable material. A red, orange or yellow colored reflective foil is preferred for reflectors 34c to enhance the color of the reflected light. A silver colored reflective foil is preferred for reflectors 34a and 34b where the incident light has already been colored. While foil is currently preferred for forming the reflectors 34, it is also contemplated that reflective glass or other reflective materials

may be substituted. For instance, in gas fireplace applications, it may be necessary to utilize a heat resistant mirrored glass for the reflectors 34 where it is found that a foil is affected by the high temperatures. The fuel bed 10 for gas fireplaces of course would also be required to be made from suitable heat resistant materials as known in the art.

In addition to the reflectors 34, it has been found that an enhanced fuel bed effect is generated by randomly sprinkling minute flecks 60 of reflective material on the combustible fuel 22 and ember bed 24. The flecks 60 are formed of a similar reflective metallic foil as is preferred for forming the reflectors 34. The flecks 60 are sufficiently minute in size (two millimetres or less in width) to give the illusion of a sparkling ash. Due to the minute size and random distribution of the flecks (which are disposed in a variety of different angular orientations on the fuel bed 10 to reflect light from different angles above and below the flecks 40), the viewer 48 observes random sparkles of light from the fuel bed 10 for brief instances of time (since the sparkle will disappear when the viewer 48 moves slightly such that the angle of observed reflected light changes). The flecks 60 may be treated with a glue before being sprinkled upon the fuel bed 10 or the fuel bed 10 may be sprayed with a clear adhesive substance prior to sprinkling of the flecks 60.

Referring to Fig. 5, a second embodiment of simulated fuel bed 10 is shown. For convenience, corresponding elements from the embodiment described above are assigned the same reference numerals.

In the second embodiment of fuel bed 10, a flicker element 20′ is located beneath the ember bed 24 for reflecting light from a light source 30′. The flicker element 20′ has a similar construction to the flicker element 20 located behind the screen 16 as described above (including the description in the above referenced patents incorporated by reference). The flicker element 20′ includes a plurality of reflective strips 60 extending

from an axis 31'. The flicker element 20' is caused to rotate about the axis 31' by means of an electric motor 62. The rotation of the flicker element 20' produces moving beams of light from a light source 30' that are subsequently transmitted to and reflected by reflectors 34a, b to give the impression of burning embers of differing heat intensity.

Referring to Fig. 6, a third embodiment of the fuel bed 10 is shown. Again, for convenience, corresponding elements from the embodiments described above are assigned the same reference numerals.

In the third embodiment of fuel bed 10, a flicker element 20' and a static reflector 70 are located beneath the ember bed 24. Light from the light source 30' may be transmitted to the reflectors 34a, b directly or by reflection by the flicker element 20' further by the static reflector 70. By virtue of its rotation, the flicker element 20' produces moving beams of light which, when reflected in reflections 34a, b provide the observer with the impression of glowing embers and ashes, the appearance of which is constantly changing, with different areas constantly becoming more and less intensely illuminated.

The ember bed 24 also includes a plurality of light transmitting apertures 72. The apertures 72 will generally have a diameter (if generally circular) or a width of between 4 and 20mm, preferably between 6 and 12mm and especially about 8mm. The reflectors 34a, b are of a size generally equivalent to the size of apertures 72.

The combustible fuel 22 and the ember bed 24 are so arranged that light reflected from the flicker element 20' may pass (via the static reflector 70) through the apertures 72 onto the reflectors 34a, b.

The apparatus of the invention will desirably include a transparent or translucent front screen 80 which may be of glass or other

suitable material such as a plastic. Preferably, the front screen 80 will be tinted (or "smoked") so that when the light source 30' is not switched on, the interior of the apparatus is not visible to the observer.

In order to enhance the visual effect provided by the apparatus of the invention, the depth of the simulated hearth may be increased by providing an additional simulated fuel bed 24' and at least one additional simulated combustible fuel piece 22' with reflectors 34a, b in front of the screen 80. An additional static reflector 71' is then provided to reflect light directly from the light source 30' and from the flicker element 20' onto the reflectors 34a, b.

It is to be understood that what has been described is a preferred embodiment to the invention. The invention nonetheless is susceptible to certain changes and alternative embodiments fully comprehended by the spirit of the invention as described above, and the scope of the claims set out below.

I CLAIM:

1. A simulated fuel bed for a fireplace comprising:
an ember bed;
a combustible fuel; and
at least one reflector mounted to at least one of said ember bed and said combustible fuel in a position to simulate a hot ember by reflecting light transmitted from a light source.

2. A simulated fuel bed as claimed in claim 1 further comprising a grate disposed between said combustible fuel and said ember bed.

3. A simulated fuel bed as claimed in claim 1, wherein said ember bed and said combustible fuel are integrally formed.

4. A simulated fuel bed as claimed in claim 1, wherein said combustible fuel resembles at least one log of wood.

5. A simulated fuel bed as claimed in claim 1, wherein said combustible fuel resembles at least one lump of coal.

6. A simulated fuel bed as claimed in claim 1, wherein said fuel bed is incorporated within an electric fireplace.

7. A simulated fuel bed as claimed in claim 1, wherein said fuel bed is incorporated within a gas fireplace.

8. A simulated fuel bed as claimed in claim 1, wherein said reflector is generally polygonal in shape.

9. A simulated fuel bed as claimed in claim 8, wherein two sides of each said reflector extend generally parallel to an axis of said combustible fuel corresponding to a simulated grain.

10. A simulated fuel bed as claimed in claim 1, wherein a plurality of said reflectors are arranged in an ember pattern, said ember pattern including non-reflecting spaces between adjacent reflectors to simulate cracks between embers.

11. A simulated fuel bed as claimed in claim 1, wherein said reflector includes a plurality of reflecting regions and non-reflecting regions arranged in an ember pattern, said non-reflecting regions simulating cracks between embers.

12. A simulated fuel bed as claimed in claim 1, wherein said reflector is generally silver in color.

13. A simulated fuel bed as claimed in claim 1, wherein said reflector is one of generally red, orange or yellow in color.

14. A simulated fuel bed as claimed in claim 1, wherein said reflector is formed from a reflective metallic foil.

15. A simulated fuel bed as claimed in claim 1, wherein said reflector is formed from a mirrored glass.

16. A simulated fuel bed as claimed in claim 1, wherein said ember bed defines at least one translucent portion for transmitting light from said light source to simulate a hot ember.

17. A simulated fuel bed as claimed in claim 16, wherein said reflector is mounted to said combustible fuel in a downwardly facing

position sufficiently opposing said translucent portion of said ember bed to reflect light transmitted through said translucent portion to simulate said ember.

18. A simulated fuel bed as claimed in claim 1, wherein said light source is a gas flame.

19. A simulated fuel bed as claimed in claim 1, further comprising a plurality of reflective flecks disposed on said fuel bed.

20. A simulated fuel bed as claimed in claim 19, wherein said flecks are two millimetres or less in width.

21. A simulated fuel bed as claimed in claim 1 further comprising a flicker element for reflecting light from the light source to said at least one reflector mounted to one of said ember bed and said combustible fuel, said flicker element including means for moving said reflector to produce moving beams of reflected light.

22. A simulated fuel bed as claimed in claim 21 wherein said flicker element is located beneath at least one of said ember bed and said combustible fuel.

23. A simulated fuel bed as claimed in claim 22 wherein said flicker element extends along an axis generally parallel to said combustible fuel and said moving means comprises means for rotating said flicker element about said axis.

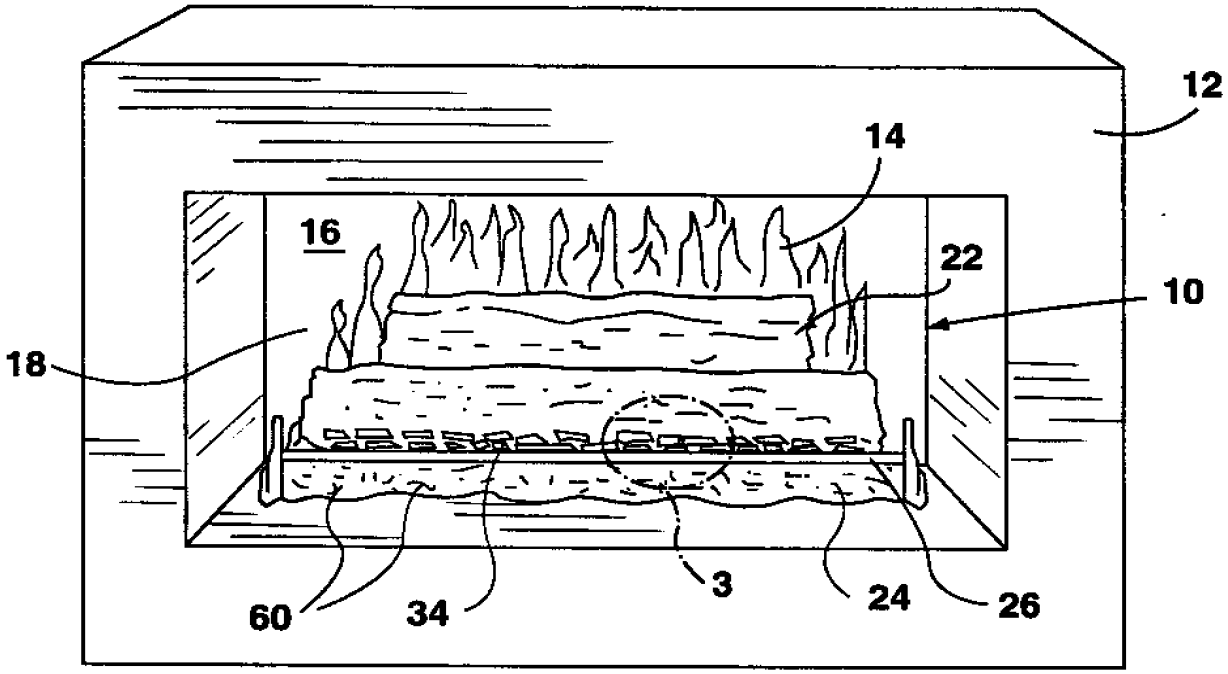

FIG. 1

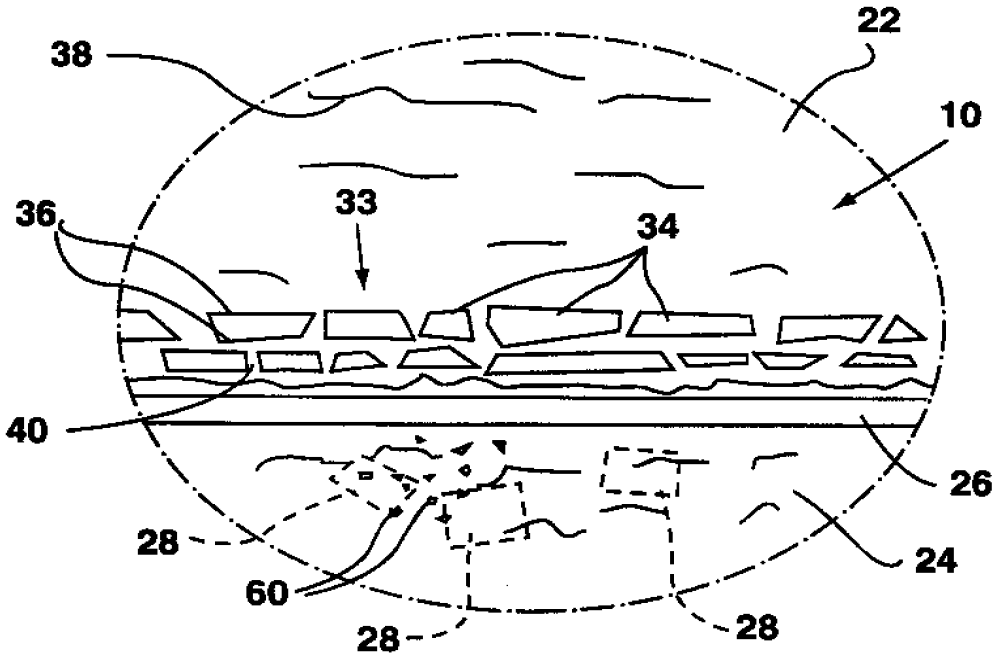

FIG. 3

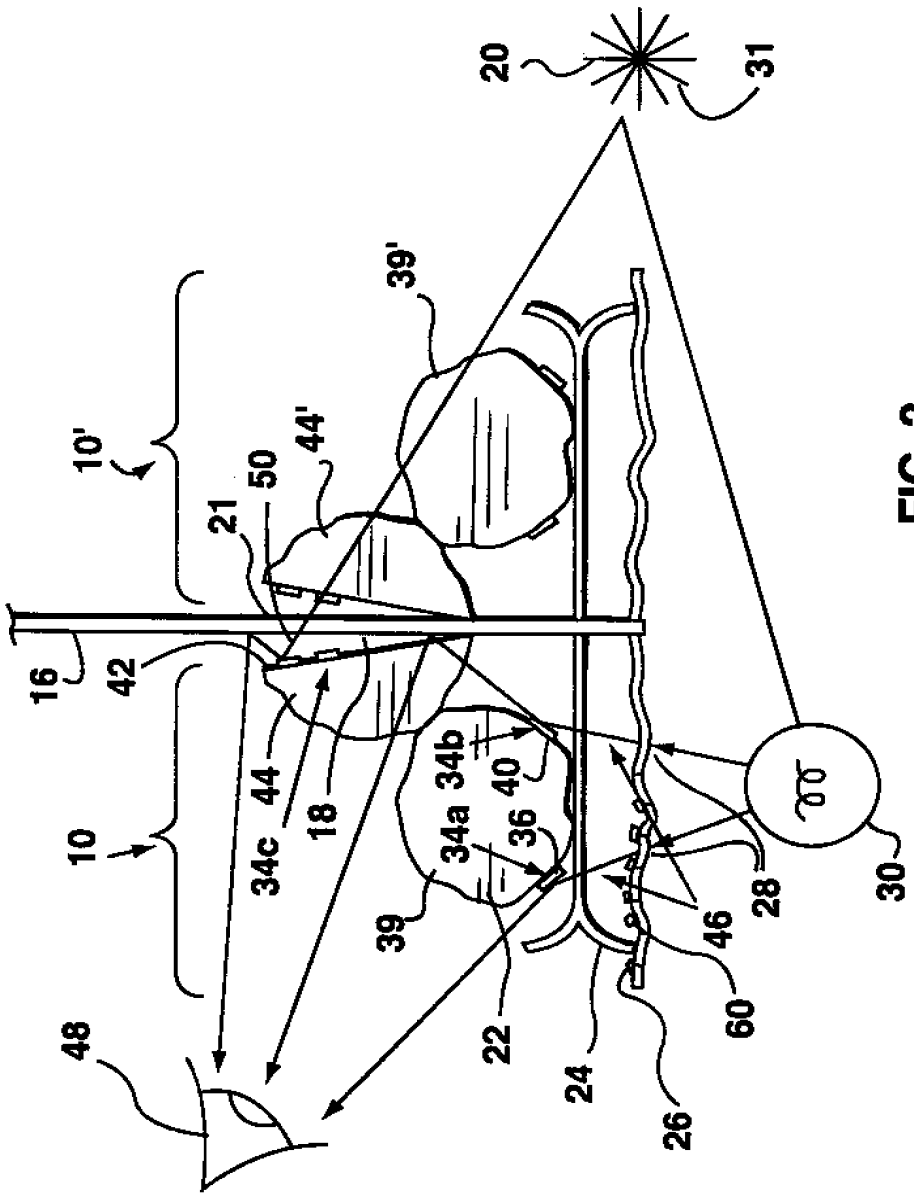
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FIG. 2

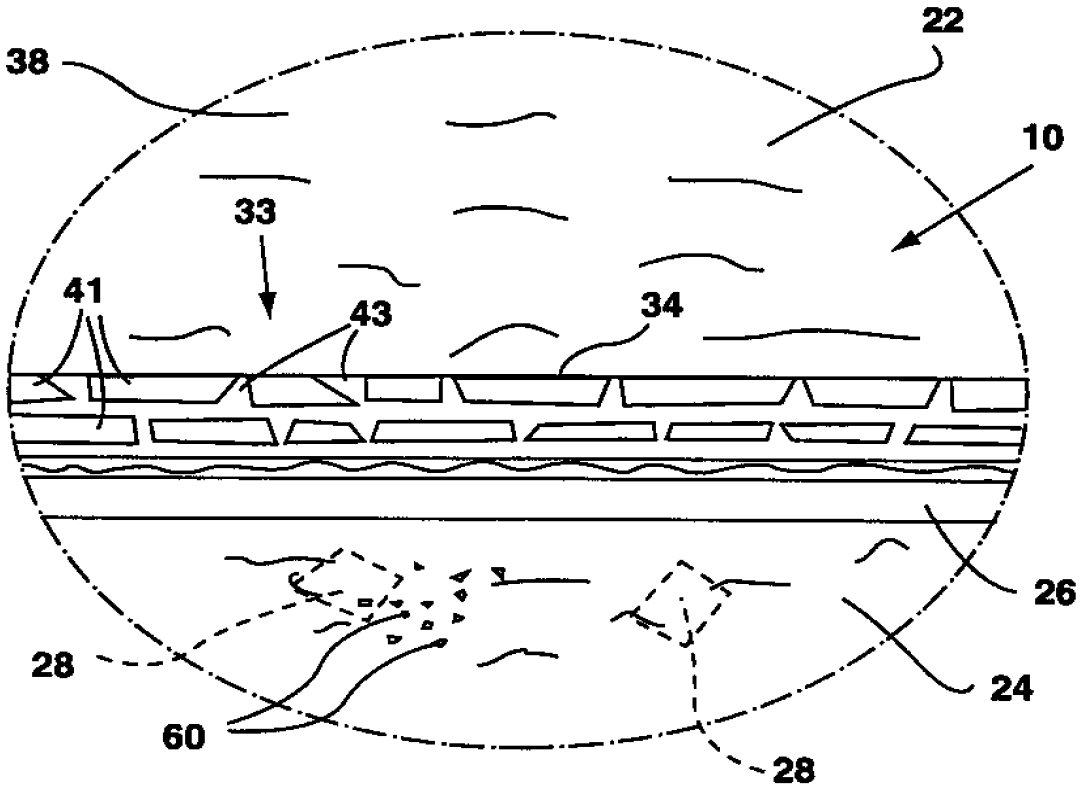

FIG. 4

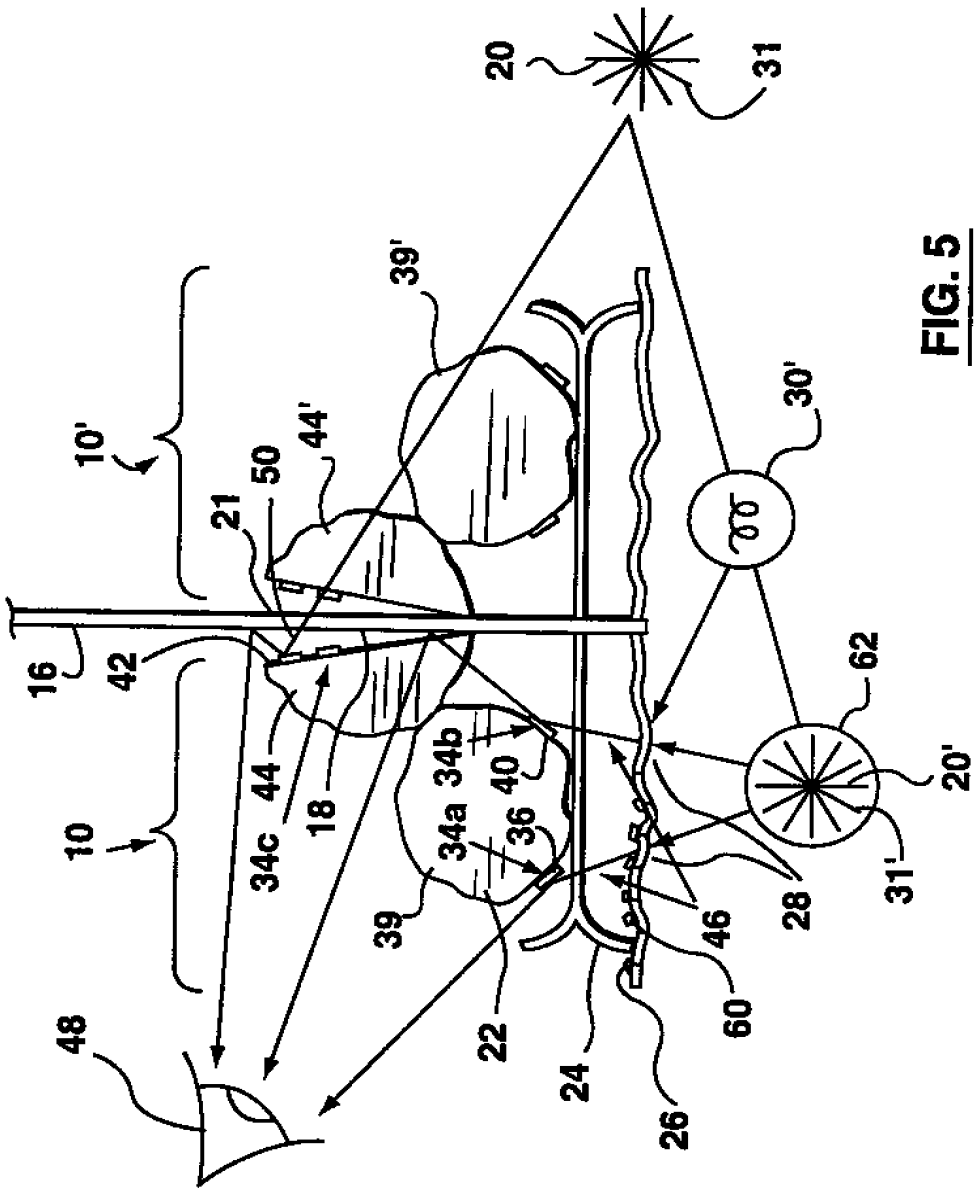
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FIG. 5

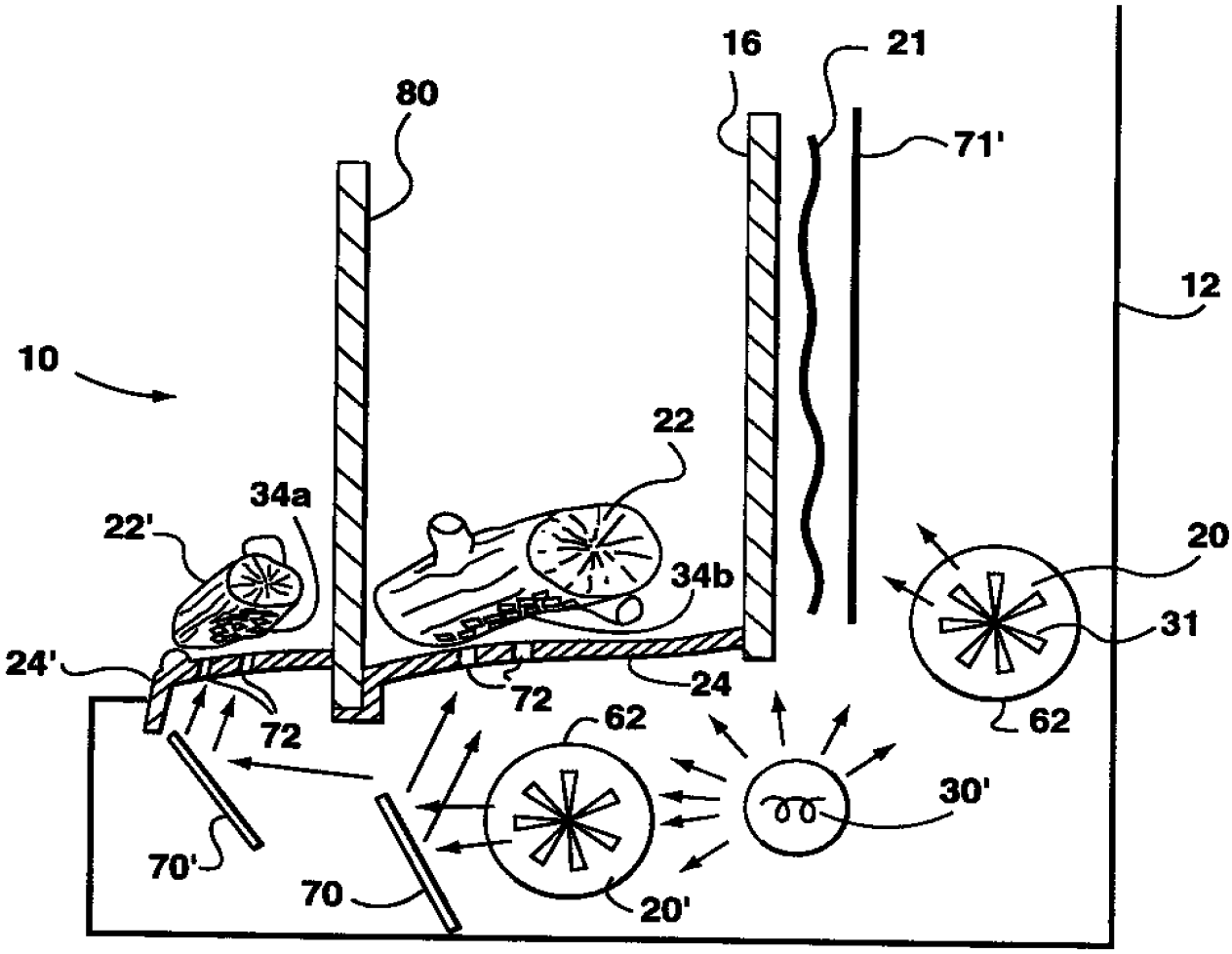

FIG. 6

INTERNATIONAL SEARCH REPORT

ernational Application No
PCT/CA 99/00190

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 F24C3/00 F24C7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 F24C G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 41393 A (DIMPLEX NORTH AMERICA LIMITED ;HESS KRISTOFFER (CA); MACPHERSON DA) 6 November 1997 see the whole document	1-6,8, 16,21-23
A	EP 0 611 921 A (BASIC PATENT) 24 August 1994 see abstract; figures 1-3	1,5
A	GB 2 198 835 A (GRATE GLOW FIRES) 22 June 1988 see abstract	1,7
A	GB 2 261 942 A (HEPWORTH HEATING LTD) 2 June 1993 see abstract; figures 1,2	1

[ ] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
21 May 1999	31/05/1999

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CA 99/00190

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